

# The insider Focus on Nordic research

## Getting it together

In a world of big players, what are small countries to do? Take a look at the newly emerging Nordic bloc, says **Alison George**

A ROBOT submarine with a mind of its own could transform the dark and tricky world of inspecting pipelines and communications cables on the ocean floor. This novel addition to the latest generation of autonomous underwater vehicles (AUVs) is under development by an equally novel collaboration between Danish and Norwegian submarine makers and Swedish data specialists. Its makers promise a prototype will be ready next year.

Mathematician Jan Holst and his team from Lund University in Sweden are adding new data-interpretation software to existing unmanned underwater vehicles that will allow an onboard computer to take decisions about which part of the pipeline or cables to inspect more closely. "It's a completely new thing," says project leader Anders Bjerrum, a Danish AUV consultant.

The Nordic Joint Offshore Robot Development (NJORD) project is a collaboration between two manufacturers of AUVs – one Danish and one Norwegian – and the Lund researchers. The advantages of pooling resources this way are clear: access to more expertise and better investment. "By joining forces, we get results faster. We wouldn't be able to do this in Denmark alone," says Bjerrum.

This kind of cross-border collaboration is becoming increasingly common in the Nordic region. In a world of big players, it's tough being small. And although the Scandinavian trio of Denmark, Sweden and Norway plus Finland and Iceland cover a substantial area, they are relative minnows in terms of population and economy. Even Sweden with by far the largest population of the Nordic nations (nearly 9 million) is small compared to Germany's 83 million, or the US's 278 million. And when it comes

to economic clout, the Nordic countries have a combined GDP equivalent to some €540 billion in 2003, one-third of Germany's GDP, and around 1/15th that of the US.

So it makes good sense either to work together for that crucial critical mass and the infrastructure needed to make big scientific breakthroughs – or to forge partnerships with other groups within Europe and beyond. "If you compare the rankings of US and European universities in terms of papers, you normally find that US universities come higher up. They are larger and have bigger research budgets," says Hans Wigzell of the Karolinska Institute in Stockholm. "But if you look at isolated topics, you find there is excellent science going on in Europe." Linking scientists is fundamental, he says: "It's like linking up a series of Macs and getting a supercomputer."

Though they are neighbours, each of the Nordic countries has its own approach to science. Sweden has a long history of excellence in medicine, while Norwegian research is focused more on the marine environment and geoscience, and in Denmark biology and agriculture take priority. Thanks to

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Hans Wigzell  
Karolinska Institute

Nokia, Finland now punches far above its weight in telecoms, while Iceland is big in geoscience and genetics.

The Swedish government is the world's most generous investor in research, devoting 4.3 per cent of its GDP to R&D in 2001, according to the most recent OECD figures. Finland was in second place (3.4 per cent), with Denmark (2.2 per cent) and Norway (1.6 per cent) lagging well behind. Overall, the Nordic countries have an enviable record for the impact of their research, and all but Norway are in the world's top 20 as ranked by the impact of their papers according to the Institute of Scientific Information indexes.

But increasingly the European Union is the driving force behind research programmes, not national governments. The successful projects in the sixth round of the EU's giant Framework research programme will be announced over the coming months as the contracts are signed. Nordic countries are participating in around one-fifth of the projects. Suzanne Dickson of Gothenburg University, for example, will lead the €14 million project called Diabesity, which will find new drug targets for obesity and type 2 diabetes. Another Swedish researcher, Birgitta Normark, will coordinate the Previs project investigating the causes of antibiotic resistance. Even Norway, though not a member of the EU, is involved. "We have chosen to opt in to Framework 6," says Kim Davis of Research Council Norway. "We wanted to be part of the European research community, without necessarily joining the EU."

On top of involvement in the EU, the Nordic group is looking out for its own interests. The potential submarine star, NJORD, for example, is part-funded by the Oslo-based Nordic Innovation Centre, set up by the Nordic Council of Ministers to boost innovation and applied research across the group. Another Oslo-based organisation, the Nordic Academy for Advanced Study, distributes 37 million Norwegian kroner annually (€4.3 million) for projects such as Nordic Marine

Academy for research into marine ecosystems. And the Nordic nations have even clubbed together to fund the Nordic Optical Telescope on La Palma in the Canary Islands, to investigate phenomena such as quasars and gamma-ray burst sources.

For these efforts bear fruit, there is obviously a big need to attract and retain top people. "Excellent scientists are an essential component," Wigzell says. "If you don't fight for these people, your university will die." And while the resources available in the Nordic nations may not match those in the US, "you can show the researchers that you really want to support them", Wigzell says.

A case in point is the neural stem cell expert Jonas Frisen of the Karolinska. In 2000, when Frisen was tempted by an offer from the US, Sweden's research organisations pulled out all the stops to keep him in Stockholm. The Tobias Foundation, founded by Swedish businessman Marcus Storch in memory of his son who died of leukaemia, funded a professorship at the Karolinska and the running costs of Frisen's lab.

But Frisen says that money was not the deciding factor in his decision to stay in Sweden. "There was much more cash to go to the US, so money was definitely not the reason I stayed." Sweden is a good place to do science, Frisen says and the country's recent

enthusiasm for the commercialisation of research was part of the attraction. In 1998 Frisen and his colleague Ann Marie Janson founded the company NeuroNova to exploit the regenerative potential of stem cells to find new ways to treat disorders of the central nervous system.

Attracting researchers to the region from abroad is an even tougher challenge (*New Scientist*, 21 June 2003, p 58), possibly because the region seems remote to outsiders. But international collaborations could help change this.

**Sweden leads the world in GDP spent on research**

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"Once you develop good relationships, this leads to others being interested. It's a snowball effect," says Kjell Hauge of the Norwegian Geotechnical Institute (NGI) in Oslo, a centre of excellence for engineering geology.

The NGI boasts more nationalities among its staff than most Nordic organisations. Its managing director, Suzanne Lacasse, who was previously head of the geotechnical laboratory at the Massachusetts Institute of Technology, is French Canadian. And the director of the NGI's International Centre of Geohazards is Farrokh Nadim, originally from Iran.

Looking to the future, the Nordic countries might find some distinct advantages in their location as the EU expands to include Estonia, Latvia, Lithuania and Poland – just across the Baltic Sea from Sweden. Research projects linking scientists from the new member countries are already under way. The Bonus project to help clean up pollution in the Baltic is one of the big examples, co-funded to the tune of €3 million by the EU.

This may be local science but it's not small science. As the Nordic countries have proved, if a small country wants to be an international player in science then it pays to collaborate. ●

## THE FINNISH LINE

Half a century ago, Finland was a largely rural economy, and the majority of Finns worked on the land. Now that figure is around 5 per cent, and Finland is a textbook model of an advanced industrial economy.

"In the late 1960s, the level of technology was not high, with investment in R&D well below the OECD average," says Pekka Pellinen, director of the Finnish Association of Graduate Engineers. The critical time was the 1980s, when the government began investing in science with the aim of promoting research in high-tech fields and creating a knowledge-based society. "Gradually Finland overtook,

country by country, and now about 3.5 per cent of our GDP is spent on R&D," says Pellinen.

This boost to R&D was crucial, and set the scene for the subsequent high-tech boom epitomised by the growth Finnish mobile phone giant Nokia. "We created a knowledge base in the public sector and so made it possible for the private sector to capitalise in the late 1980s, particularly in the technology sector," says Pellinen.

Now Finland is pinning its hopes on biotechnology. The country's biotech industry ranks sixth in Europe, with around 100 companies. Most, however, are small and young. Two Turku-based

companies – Hormos Medical, specialising in hormone-based therapies, and BioTie Therapies, which focuses on anti-addiction treatments – are among the brightest stars. But even they are some years away from bringing a product to market.

The scientific standards and the level of government support are high, says Saara Hassinen of Finnish Bioindustries, the country's biotechnology industry association. But for Hassinen a vital ingredient is missing: venture capital. Finland does not have a well-developed investment community, so the country's biotechs need to attract investors from abroad.